

## IMPROVED AIR CLEANER

### Technical Field

The present invention relates generally to an air cleaner and, more  
10 particularly, to an air intake filter having an integral coupling means supported by  
an essential component.

### Background

In order to prevent damage to devices requiring air, it is necessary to filter  
15 or pre-clean the air flowing to those devices. Currently, air cleaning assemblies  
or air pre-cleaners, for removal and discharge of particulates from the intake air,  
are mounted in a stack or canister. The replacement of such filters is often  
complex and time consuming, necessitating the requirement for additional tools.

Additionally, the replacement of current air cleaners is often complex,  
20 requiring the installer to maneuver within a confined space. The air cleaners  
generally comprise a felted mass of fibers, such as cotton, synthetic resins, or  
the like, thereby forming a mass.

Although the current air cleaners may adequately perform with respect to particulate removal, the replacement of air cleaners, as required in typical maintenance of equipment, is often difficult due to the aforementioned problems.

One of the current air cleaning devices is described in U.S. Pat. No. 5 6,361,574, issued on March 26, 2002. The invention provides a filter canister with a filter mounted therein to filter air passing from an inlet end of the canister to an outlet end. The filter within the canister is formed of an outer cylindrical filter and an inner cylindrical filter mounted to the outlet wall of the canister to filter the pre-cleaned air that passes through an inlet opening of the canister into the air space 10 between the interior of the canister and the outer filter.

While the aforementioned air cleaning apparatus adequately provides for removal and discharge of particulates from the intake air as well as thorough air filtering in a compact unit, the removal and replacement of the unit, as required in general maintenance, necessitates a number of additional tools, as well of a high 15 degree of effort from the individual fulfilling the task.

An additional air cleaning apparatus is described in U.S. Pat. No. 5,935,281 issued on August 10, 1999. The patent discloses an air filter having a housing defining a filter chamber, a fluid flow inlet opening to a first region of the filter chamber and a fluid flow outlet opening to a second region of the filter 20 chamber. A filter element extends within the housing between the first region of the filter chamber for receiving unfiltered contaminated air and the second region of the filter chamber for receiving filtered air having passed through the filter element. Additionally, this includes an outer housing defining a filter chamber.

The filter housing comprises a generally cylindrical body extending along a central axis and end closure members at the axially opposite ends of the body.

The end closure members may both be detachably secured end caps, for example by threading, clamping or otherwise. Alternatively one of the two may be  
5 formed integrally with the body to provide a pot-like shaped housing having a detachable end cap at its open end.

The while the aforementioned disclosure recites an end closure member that is threaded, the filter element is not integral with the end closure element, but is merely disposed within the housing.

10 Presently, all known air cleaners require additional clips, bands, or even a separate housing to be attached to their respective receptacle.

Furthermore, many air cleaners require special tooling, and are particularly difficult to remove when attached to their respective receptacles within the associated apparatus.

15 It would be desirable to provide an air cleaner that has an integral coupling means, thereby allowing the air cleaner to be attached to an appropriate receptacle without requiring any additional clips or bands.

It would further be desirable to provide an air cleaner that is easily removable from its respective receptacle within the associated apparatus.

20 It would still further be desirable to provide an air cleaner wherein an essential component of said air cleaner serves to support the coupling means, thereby minimizing associated costs and increasing overall stability.

## Summary of the Invention

In view of the foregoing, it is an object of this invention to provide an air cleaner having an integral coupling means. Additionally, the integral coupling means allows the novel air cleaner to be mounted in the desired position without  
5 requiring any additional brackets or clips.

It is a further object of the present invention to provide an air cleaner wherein the coupling means is further supported by a rigid armature or support member to assure the integrity and overall stability of the coupling means when securely attached to a designated receptacle.

10 It is still a further object of the present invention to provide an air cleaner with an integral coupling means wherein an essential component of the air filter serves as the armature or support member for supporting said coupling means.

The present invention comprises a novel air cleaner having an inner mesh barrier. This inner mesh barrier comprises a plurality of openings and is generally  
15 cylindrical, having an inner mesh barrier inner surface and an inner mesh barrier outer surface. Furthermore, the air cleaner comprises an upper retaining segment and a lower retaining segment, and a filtration means, such as, for example, a felted mass of fibers, such as cotton, synthetic resins, or the like, thereby forming a mass. Typically, the upper retaining segment and the lower  
20 retaining segment serve to contain the filtration means and the inner mesh barrier.

The lower retaining segment of the air cleaner comprises an outer surface having an integral coupling means protruding outward there from. The integral

coupling means of the present invention is generally molded from the same material as the lower segment of the air filter. Furthermore, the integral coupling means comprises an inner surface and an outer surface, wherein said outer surface of said integral coupling means comprises a plurality of threads for  
5 thereby attaching the air filter to a suitable device. Additional embodiments are contemplated wherein the inner surface of the coupling means is threaded, for coupling with an externally threaded receptacle.

### **Brief Description of the Drawings**

10 The invention as well as its features and advantages will become more apparent from the following description of a preferred embodiment of the invention and the accompanying drawings in which like numerals represent like parts.

**Fig. 1** is a side view of the air cleaner of the present invention;

15 **Fig. 2** is a partial cross-sectional view of the coupling means for the air cleaner of the present invention;

**Fig. 3** is a partial elevated view of an internally threaded air cleaner receptacle; and

**Fig. 4** is an elevated view of the air cleaner of the present invention having  
20 a gripping means.

## Detailed Description of the Invention

Referring now to the figures, and particularly **Fig. 1**, a side view of the improved air cleaner **10** of the present invention is shown. The improved air cleaner **10** comprises an upper retaining segment **15**, a lower retaining segment **16**, and a filtration means **17**. Generally, the filtration means **17** may be a felted mass of fibers, such as cotton, synthetic resins, or the like, thereby forming a mass. Typically, the upper retaining segment **15** and the lower retaining segment **16** serve to retain the filtration means **17**, as well as the inner mesh barrier **11** (**Fig. 2**).

Furthermore, the lower retaining segment **16** of the air filter comprises an outer surface **18** having an integral coupling means **19** protruding outward therefrom. The integral coupling means **19** of the present invention is generally molded from the same material as the lower retaining segment **16** of the air cleaner. Additionally, a particular embodiment of the present invention is contemplated wherein the coupling means **19** and the lower retaining segment **16** of the air cleaner are integral, and molded from a urethane material, however any suitable material is within the scope of the invention. Furthermore, because the threads **22** are urethane, neither pipe thread sealant nor Teflon tape will be required to assure a positive seal.

Referring now to **Fig. 2**, a partial cross-sectional view of the coupling means **19** for the improved air cleaner **10** of the present invention is shown. The air cleaner **10** further comprises an inner mesh barrier **11**. The inner mesh barrier **11** comprises a plurality of openings **12** and is generally cylindrical, having

an inner mesh barrier inner surface **13** and an inner mesh barrier outer surface **14**. The integral coupling means **19** comprises an inner surface **20** and an outer surface **21**, wherein said outer surface **21** of said integral coupling means comprises a plurality of threads **22** for thereby attaching the air cleaner to a designated receptacle. Referring to **Fig. 3**, a partial view of an internally threaded air cleaner receptacle **26** is shown. While the embodiment described discloses an externally threaded coupling means, additional embodiments are contemplated wherein the inner surface of the coupling means is threaded, for coupling with an externally threaded air cleaner receptacle.

Referring again to **Fig.1** and **Fig. 2**, the coupling means **19** comprises a contiguous end **23** and a distal end **24**, wherein said contiguous end **23** comprises an annular groove **25**. The annular groove **25** of said contiguous end **23** of said coupling means **19** extends a distance toward the distal end **24** of said coupling means **19**. Furthermore, said annular groove **25** of said contiguous end **23** of said coupling means **19** is appropriately sized to receive a portion of the inner mesh barrier **11**. The inner mesh barrier **11** extends within said coupling means **11** toward said distal end **24** to thereby serve as an armature, or support member to firmly support plurality of threads **22** of the coupling means **19**. In a particular embodiment of the present invention the inner mesh barrier **11** is comprised of a metallic material such as, for example, aluminum, however any material that will adequately serve as a mesh barrier, as well as the support member for the plurality of threads **22** may be used. Utilizing the inner mesh barrier **11** as a support the coupling means serves to provide rigid support for the

coupling means thereby improving the overall integrity of the coupling means while minimizing the number of components utilized in the air cleaner **10**.

The air cleaner of the present invention **10** is easily installed into a designated receptacle **26** without requiring any additional tools, brackets, or  
5 components. In operation, the air cleaner of the present invention **10** is coupled to a designated receptacle **26** simply by inserting the threaded coupling means **19** of the air cleaner into a designated internally threaded air cleaner receptacle **26**, and rotating the air cleaner **10** until adequately secure within the receptacle **26**. Additionally, when desired, the air cleaner of the present invention **10** may  
10 be removed from the receptacle **26** by rotating the air cleaner **10** in the opposite direction, until the threaded portion **22** of the coupling member **19** and the receptacle **26** disengage.

Referring now to **Fig. 4** a further embodiment of the present invention is illustrated. The upper retaining segment **15** further comprises an upper retaining  
15 segment outer rim **27**, wherein said upper retaining segment outer rim **27** comprises a plurality of recesses or scallops **28**. The scallops **28** are molded in the upper retaining segment **15**, and serve to provide a gripping means making installation and removal of the improved air cleaner **10** less cumbersome. While the illustrated embodiment comprises four scallops **28**, embodiments of the  
20 present invention having one or more scallops **28** are contemplated.

While this invention has been described as having particular embodiments, the present invention can be further modified within the spirit and scope of this disclosure. This application is therefore intended to cover any



variations, uses, or adaptations of the present invention using the general principles disclosed herein.